A DISTRICT-BASED AUDIT INTO THE CAUSES AND CIRCUMSTANCES OF MATERNAL DEATH IN SOUTH KALIMANTAN INDONESIA

Endang Achadi, MotherCare/ Indonesia
Carine Ronsmans, London School of Hygiene and Tropical Medicine
Gunawan Supratikto, MotherCare/ Indonesia
Margareth E. Wirth, MotherCare/ Indonesia

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INTRODUCTION

The high rates of maternal and perinatal mortality in developing countries are key challenges facing health professionals. Many maternal and perinatal deaths can be avoided with appropriate care and a large proportion may result from poorly managed deliveries (WHO 1994, Kusiako et al 2000). Innovative ways to ensure women receive high quality maternal health services are in demand.

One promising way to improve the quality of the care women receive is to conduct audits of care. Audits generally focus on care in health facilities and aim to improve the quality of health care by comparing the care that was given with an agreed standard (Crombie et al 1993). When deficiencies in the delivery of care are identified mechanisms for improvement are sought and actions proposed.

An example of national audits that have been influential in the context of maternal health are the enquiries into the quality of maternal health at the national level are the British Confidential Enquiries into Maternal Deaths, initiated in 1952 (Ministry of Health 1957). In these enquiries, all available recorded facts for each maternal death are reviewed, factors that may have led to the death are assessed, and specific recommendations for improving clinical practice are made. While there is extensive experience with such approaches in developed countries, there is little experience so far with audits of or enquiries into maternal health care in developing countries (Mancey-Jones and Brugha 1997).

In this paper, we report the experience of an enquiry into maternal and perinatal deaths which aims at documenting the medical as well as the non-medical factors that may contribute to maternal and perinatal mortality. In 1994, the Indonesian Ministry of Health introduced a maternal and perinatal audit system as a tool to bring both continuous surveillance of maternal and perinatal mortality and quality assurance of obstetric services under the domain of the district health system. The audit system is unique in that efforts are made to move from a mere assessment of substandard care to the formulation of recommendations for improvements in access to and quality of care. The aim of this paper is to describe the maternal and perinatal audit system introduced in three districts in South Kalimantan, Indonesia and to draw key lessons for improvements of the system.

The context of Safe Motherhood in South Kalimantan, Indonesia

The maternal mortality ratio in Indonesia is estimated at 390 deaths per 100,000 live births (CBS, 1995). In 1993, research indicating that the majority of deliveries took place at home with a traditional birth attendant led the Ministry of Health to launch a training program for midwives to be deployed in village health posts. By 1999, 53,000 midwives had been trained and posted in villages. The village midwives are expected to live in the community they serve and are supervised by the doctor and midwife at the community health centre in the sub-district. They offer antenatal and delivery services to all pregnant women in their community during home visits or at their clinic. Together with the midwives in the health centres, they form a unique cadre of professional birth attendants accessible to women in even the remotest villages.

In 1995, the Ministry of Health with the support of MotherCare, USA, introduced additional Safe Motherhood services in three districts of South Kalimantan, a fairly rural province in the Indonesian portion of the island of Borneo. A sisterhood survey conducted in 1995 estimated the maternal mortality ratio in South Kalimantan at 543 per 100,000 live births (Provincial Statistics Office, 1996). The target population in the three districts is comprised of almost one million inhabitants and is served by five government hospitals and fifty-five government community health centres. By 1997, the estimated twenty-five thousand pregnant women in these three districts were being served by over five hundred and thirty village midwives (approximately 50 pregnancies per midwife per year).

The Maternal and Perinatal Audit (MPA) system

The MPA was developed in 1994 as one of the many strategies of the Ministry of Health to reduce maternal mortality. The Ministry of Health developed guidelines for the MPA to be piloted in eight of Indonesia's twenty-seven provinces. From this initiative, 'model' MPA projects emerged in two provinces, Java Tengah in Central Java and Nusa Tenggara Barat in Lombok. The Safe Motherhood initiative supported by MotherCare in South Kalimantan, which began in late 1995, built on the MPA experiences of these two provinces and has evolved over time. We report here the process of development of the MPA in the three districts covered by the MotherCare programme. Although the MPA focuses on perinatal as well as maternal deaths, this paper will mainly report findings on maternal death audits.

The overall objective of the MPA is to contribute to a reduction in perinatal and maternal mortality through an improvement of the quality of Maternal and Child Health services at the district level. More specifically, the aims of the MPA are (1) to identify any avoidable or substandard care factors for maternal and perinatal deaths, (2) to strengthen the links between the district health office, the district hospital and the health centres, (3) to make recommendations for the improvement of service organisation and clinical care at the district level, and (4) to assess the main causes of maternal and perinatal deaths. In addition to facility-based elements of care, the MPA also explores community-level obstacles to seeking care such as delays in family decision making and transportation problems. By focusing on the medical as well as the non-medical barriers to the use of appropriate care in the district, the MPA is seen as a valuable tool for the improvement of comprehensive maternal health services at the district level.

The components of the MPA system

Death ascertainment and reporting

In South Kalimantan, many perinatal and maternal deaths occur in the community or in transit to a health facility, and vital registration systems often miss such deaths. In Indonesia, the wide coverage of village midwives allows for a more complete registration of deaths. By 1999, the village midwives in South Kalimantan attended nearly 100% of pregnant women antenatally and 50% at the time of delivery. The village midwives are responsible for reporting all maternal and perinatal deaths in their community to the health centre (figure 1). The midwife knows about such deaths either because she cared for the woman, or because the village leaders reported the

death to her. In addition, maternal deaths occurring in the hospital are reported directly to the district health office, which informs the village midwife in whose target community the deceased woman lived.

The post-mortem interview

As soon as the village midwife is notified of a maternal or perinatal death in her community, she visits the family of the deceased and conducts a home interview. The interview usually takes place within one week of the death. This 'verbal autopsy' seeks to uncover clinical signs and symptoms as well as socio-economic factors contributing to the death, including delays (Ronsmans and Campbell 1995). The clinical sections of the verbal autopsy include checklists on the woman's obstetrical history, data on the current pregnancy, delivery history, and complications in the current delivery.

To identify the non-medical factors contributing to the death, the interviewer is guided by a conceptual framework developed by MotherCare/JSI, 'Pathway to Survival' (figure 2). The 'Pathway to survival' reconstructs the complex series of events that may lead to a perinatal or maternal death. Particular attention is paid to documenting the presence of and reasons for delays in family decision-making to refer a woman with a complication, delays in reaching appropriate care, and delays in receiving care from the health provider once the appropriate level of care was reached.

For women who were in contact with the health services prior to death, the village midwife also contacts all the relevant health providers (traditional birth attendant, midwife and/or doctor) and obtains further information from them. If the woman was hospitalised, the village midwife also consults the medical records and also copies elements that she deems are relevant to the case.

Finally, the village midwife assigns a cause of death and reports directly to the health centre where a senior midwife or doctor checks the information collected for completeness and consistency. The staff at the health centre also verifies the accuracy of the cause of death. All interview forms are reported to the District Health Office.

District MPA team

Once a month, a meeting at the district level brings together staff from the community health centre, midwives involved in the cases being discussed, and the district MPA team to discuss maternal and perinatal deaths that occurred in the district. The district MPA team consists of district level administrators and district hospital physicians. If community-involvement is deemed to be of particular concern in a particular case, representatives of women's organisations or other community groups are invited to the audit meeting. The size of the audit meeting is generally limited to 20-30 persons. Participants receive no fee for attending the meetings but expenses for transport and food are reimbursed.

To allow in-depth, participatory discussions of each case, the number of cases to be discussed is limited to two or three. The cases are selected purposefully on the basis of the nature of the problems identified, the frequency of the medical cause of death

and to ensure variety from one meeting to the next.

At the district meetings, the village midwife presents the background of the case and the chronology of events leading up to the death using the data gathered through the post-mortem interview. Data from health centre and hospital records are added where relevant. Next, participants discuss the case relying on the expertise of an obstetrician or paediatrician from the district hospital to guide the discussion of clinical case management. The purpose of the meeting is not to assign blame but rather to uncover the root causes of the death case at hand. In examining weaknesses in the clinical decisions and structural elements of the health system that contributed to the maternal or perinatal death, the group of health professionals engages in constructive peer review and a learning process designed to improve quality of care at each level.

Based on the contributing factors identified during the audit meetings, the MPA team at the district level designs management initiatives, proposes additional training and recommends clinical protocol and policy changes to avert similar errors in the future. A formal record of the conclusions reached in the meeting is kept by a rapporteur and reviewed by the group at the end of the meeting. The findings and recommendations are also discussed at the start of the subsequent MPA meeting to check on the progress made in resolving the problems uncovered in previous meetings.

Regional (sub-district) meetings

The districts have faced difficult tradeoffs in trying to maintain a small meeting size to allow a good forum for active discussion and yet include a significant number of midwives in each meeting. In order to allow more midwives to participate, the districts have developed smaller regional meetings, which are run every three months. The regional meeting generally consists of a group of four or five community health centres. These meetings take a similar format and are in addition to the district meetings such that, on average, in each district there is a bimonthly district level meeting and a smaller regional level meeting each month, rotating between the regional areas.

RESULTS

Maternal deaths

Between 1995 and 1999, the village midwives conducted 130 post-mortem interviews (50 in Banjar, 25 in Barito Kuala and 55 in HSS). There were large variations over the years and between districts (table 1). The district of HSS seems to have the most comprehensive reporting of maternal deaths, since the expected number of live births is lower in HSS than in the other districts[1]. The leading clinical cause of death was haemorrhage (41%) while hypertensive diseases were the second most common cause of death (32%), and sepsis or dystocia cited in only 5% and 1% of cases respectively (table 2). The three districts had similar patterns of reported causes of death.

[1] Based on official statistics for 1996, the expected number of live births per year is 11,977 in Banjar, 7,097 in Barito Kuala and 4,718 in HSS (Ronsmans et al 1999)

The highest level of attendant prior to death is shown in table 3. Less than half (41.5%) of the women had been seen by a midwife or a doctor prior to death. The majority of the women (69.2%) died outside of a health facility (30.8%).

Contributing factors

Aggregate information on contributing factors was available for 30 maternal deaths that were audited in 1998 and 1999 (table 4). Delays in decision-making and poor quality of care at the health facility were seen as contributing factors in 77% and 60% of the deaths respectively. Economic constraints were believed to have contributed to 37% of deaths, while distance to a health provider or facility or transport problems did not appear to be prominent. Interestingly, the review team found that refusal to seek care might have contributed to half of the deaths.

The tabulation of contributing factors does not reveal the depth of information that can be obtained from the verbal autopsy however. As the case study in figure 3 shows, a multitude of factors may contribute to a death, and it is not easy to pinpoint the one single factor that might have prevented the death. The story presented in figure 3 is that of Mrs A, who died as a consequence of a retained placenta followed by bleeding and shock. There clearly were multiple delays in decision-making and logistical constraints. First, the fact that Mrs A suffered three hours with a retained placenta before skilled medical help was sought suggested a delay in the traditional birth attendant recognising the emergency. Second, a delay in decision-making by the family to take the woman to the hospital once the village midwife was called added another half hour delay. Further delay time was incurred because transportation arrangements took 45 minutes, and finally, the delay in reaching the health facility contributed to the maternal death.

In addition, there were certain issues related to family decision-making and attitudes toward the health sector that were at issue in the case. Mrs A and family did not choose to call a trained health professional for the delivery, but rather, called a traditional birth attendant.

Finally, there were issues identified that related to the quality of health care provided. Mrs A's antenatal care did not include a haemoglobin check, which if low, might have indicated the need for treatment other than routine iron supplementation. It also appeared that the equipment in the village midwife's health post was inadequate. The village midwife reported that the tool to do a haemoglobin check was broken and Mrs A did not want to go to the health centre for a haemoglobin check. The obstetrician guiding the audit meeting also noted that the village midwife should have given at least 5 bottles (1000 cc) infusion for someone in shock, pressing the infusion bag if needed, and suggested that further training of village midwives in emergency care was needed. It was also noted that village midwives ought to be equipped with kits that have more flexible needles and more rapid flow for infusion.

Actions taken and solutions proposed

Examples of recommendations that emanated from the MPA include additional training needs for midwives, the recognition of a need for a blood bank and specific drugs, and the need for standard treatment guidelines (figure 4). The MPA has

resulted in concrete improvements in some aspects of the district health systems. For example, in HSS district it became clear through the MPA that the unavailability of appropriate medication at the community-level might have contributed to a number of maternal deaths caused by eclampsia. In response to this finding, the district health team decided that magnesium sulphate should be supplied to the village midwives as a standard part of their drug supply. In another instance, inconsistencies in case management between midwives in the community health centres and village midwives led to the development and distribution of a standard protocol for handling obstetrical emergencies. The Ministry of Health is currently developing a national standard essential obstetric protocol for midwives and this locally developed protocol is serving as an interim measure until the national standards are promulgated.

LESSONS LEARNED

Implementing a comprehensive audit system takes time and the current MPA system in South Kalimantan is only the start of a long process that will evolve over time. While the system can be further improved, a number of lessons have been learnt that merit discussion.

The MPA system is not solely a means of researching and documenting maternal deaths, but rather, it is an ongoing tool used by the district health offices to foster action to remove obstacles to high quality care. Many studies have documented the medical and non-medical causes of maternal mortality, using the 'three delays model' or classifying deaths as 'avoidable' and 'unavoidable', but few have offered a systemic means of monitoring and changing these factors (Fawcus et al, 1996; Kwast et al 1989; Langer et al 1999; 1992, Walraven et al 2000). The MPA with its active involvement of key persons in the health sector not only ensures ownership of the findings but also encourages implementation of the proposed changes. While this process of internal audit is difficult and time-consuming, the accountability of both health providers and policy makers dictated by this approach may well be one of the most critical factors towards improving the responsiveness of the health sector to the high levels of maternal mortality.

The MPA fosters a closer working relationship between levels of health providers by bringing together facility-based and community-based providers together to analyse and address the causes of mortality and morbidity in their areas. By improving the communication between the district health office, district obstetricians, the community health centre staff and the village midwives, the MPA system also seeks to increase appropriate referrals for obstetric emergencies, a critical element in avoiding maternal deaths. In turn, the enhanced understanding of the community-level factors contributing to each maternal or perinatal death by district health officials, allows them to offer more informed and practical recommendations to the community health centres and village midwives under their supervision.

The MPA, however, could benefit from a greater involvement and better definition of the role and responsibilities of the provincial team. The role of the provincial MPA team to-date, has been supervisory but without any clearly defined responsibilities. The provincial MPA team's primary role should be to work with the district level to ensure the smooth functioning of the information loop between the district and the

community and to facilitate the elimination of barriers between the district hospital and the community by supporting the implementation of recommendations made by the MPA process. The notion of an overarching provincial team for an audit system is an important one- such a team is uniquely positioned to transfer information and lessons from the MPA meetings between districts and make broader province wide policy changes engendered by MPA audit findings. An improved guideline for the MPA should include suggestions on who should be included in the MPA teams at each level and clearly defined responsibilities for the team.

The inclusion of village leaders, religious officials and other policy makers in the audit discussions promotes an inter-sectoral problem-solving approach to Safe Motherhood. However, although it was anticipated that by including community leaders in the audit meetings issues which aren't solely the domain of the health sector would receive greater attention, this proved not to be easy in practice. The participation of individuals or groups with no direct expertise in medical matters was felt as potentially threatening to health providers, particularly when deficiencies in clinical management were discussed. In practice, the MPA may have to temporarily abandon the involvement of community members if an open atmosphere of self-critique among medical providers is to be encouraged. At a later stage, inclusion of broader membership can be explored.

Although the MPA does not intend to apportion blame, there are a number of inherent features in the current system, which tend to put most of the responsibility – and potential blame – on the village midwife. Village midwives are the key rapporteurs, whether or not they provided care to the deceased woman. The fact that the midwife may be sanctioned if she fails to provide care to a woman living in her target area illustrates the enormous weight put on the midwife's role in preventing deaths. The obstetrician, on the other hand, represents the highest level of authority, and because there usually is only one present, his or her actions or knowledge are rarely challenged. The final conclusions, therefore, may tend to represent the obstetrician's opinion rather than a consensus statement from all those present at the meeting. Finally, since there is no confidentiality in the internal review process, care has to be taken not to use the findings for legal or other action. Clearly, the development of a true process of accountability without apportioning blame is not easy, and a number of rules and regulations on how to run and report on audit meetings will have to evolve over time.

Auditing cases of severe obstetric morbidity might be a useful alternative or complement to auditing maternal deaths (Filippi et al 1999, Mantel et al 1999). Auditing cases of severe maternal morbidity is promising because morbidity is more common than deaths, and discussing the circumstances that led to the development of a life threatening complication in a woman who survives may be less threatening to providers than discussing maternal deaths. Since the woman survived, positive elements in the care may appear and staff may be congratulated for saving the woman's life. In addition, the possibility of speaking to the woman herself offers the opportunity to obtain the woman's point of view about the care she received. It also complements information from records with what the woman says.

By using the village midwife as the central vehicle for reporting, the MPA system tends to focus on maternal deaths occurring in the community rather than in health

facilities. While this approach fosters communication and collaboration between the village midwife and higher levels of the health care system, it does not necessarily foster accountability by doctors and midwives in health facilities. The lack of authority and expertise of the village midwife in matters of hospital care does put her in an awkward position when consulting hospital records and reporting of the findings. Since the quality of facility-based care is equally critical in the prevention of maternal deaths, facility-based audits may have to compliment the community-based enquiries.

An audit is only effective if the care given is compared to explicit standards of care (Crombie et al 1993). The development of treatment guidelines is difficult, however. Although it is well established that greater reliance must be placed on scientific evidence and less on ideology and or expert opinion (Lohr et al 1998), it was not always easy to challenge local wisdom. While the Ministry of Health, with the support of MotherCare and other agencies, has developed treatment guidelines for the management of severe obstetric complications, they have not always been adopted by those involved, nor do the protocols developed always agree with internationally agreed standards. One of the practices encouraged at MPA meetings, for example, was the use of vaginal tampons to stop vaginal bleeding. Although this appears to be common practice in Indonesia, there is little evidence in support of such an intervention. Integrating evidence-based medicine into clinical practice will obviously take time, but efforts will need to be made to incorporate scientific evidence into the review process.

Finally, while the primary objective of the audit is not quantitative, the system does aid in the reporting of important statistics on community level maternal deaths-crucial information that is not currently reported in vital registration statistics. The leading causes of maternal death reported through the MPA are haemorrhage and hypertensive diseases, but it is uncertain to what extent these causes represent the actual pattern of mortality in the community since the degree of completeness of reporting is unknown. In the seven hospitals covering the three districts, the pattern of causes was substantially different, with hypertensive diseases accounting for the majority (64%) of hospital maternal deaths, followed by dystocia (16%) and haemorrhage (12%)(Ronsmans et al 1999). While we could not establish how many of the hospital deaths were also included in the MPA, the difference in causes between hospitals and the MPA suggests that for certain causes, particularly for haemorrhage, further efforts to help women reach life saving medical care in time are warranted. Sepsis mortality, on the other hand, appears to be equally low in the hospital and MPA-based data, confirming the suggestion that sepsis might have become a less important cause of death in Indonesia (Ronsmans et al 1999).

CONCLUSIONS

The MPA system put in place in Indonesia is unique in that the active involvement of care providers, policy makers and community members fosters the accountability that is necessary to improve the responsiveness of the health sector to the high levels of maternal mortality. So far, there is very little documented experience with such approaches in developing countries, and Indonesia may be setting an example from which useful lessons can be learned. The MPA system as currently implemented in Indonesia will need ongoing re-examination, however, with a focus on optimizing the

process so that necessary changes in the health care system can be identified and put in place.

Figure 1: Reporting system in the Maternal and Perinatal Audit

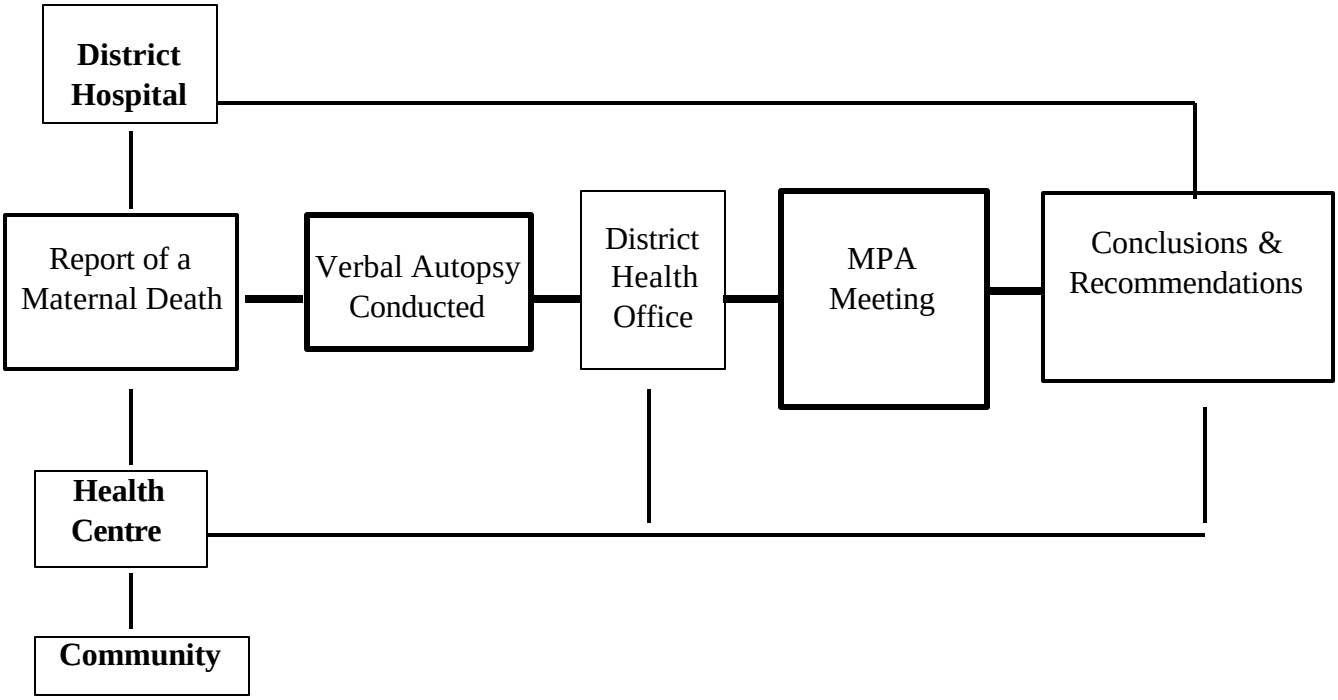
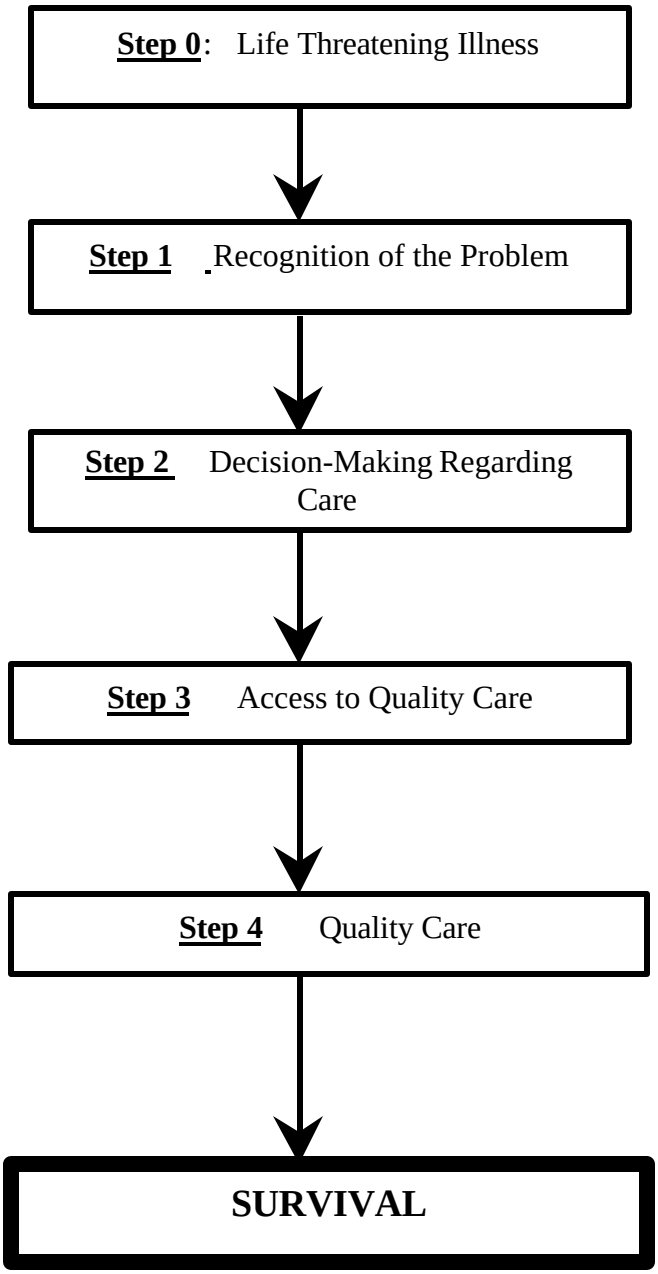


Figure 2: Pathway to Survival



TABLES

***Table 1: Numbers of maternal death reported through the MPA system, by year (3 districts in South Kalimantan 1995 – 1999*)**

	Districts			
	Banjar	**Barito Kuala**	**HSS**	**All**
Deaths by year				
1995	6	-	10	16
1996	6	8	14	28
1997	18	7	10	35
1998	10	6	15	31
1999	10	4	6	20
All	50	25	55	130

<u>Table 2</u>: Numbers and causes of maternal death by district (deaths reported through the MPA system from 3 districts in South Kalimantan 1995 – 1999)

	Districts			
Cause of death	**Banjar N (%)**	**Barito Kuala N (%)**	**HSS N (%)**	**All N (%)**
Direct obstetric				
Early pregnancy deaths[1]	1 (2.0)	-	2 (3.6)	3 (2.3)
Haemorrhage	24 (48.0)	11 (44.0)	18 (32.7)	53 (40.8)
Antepartum	-	2	-	2
Postpartum				
Retained placenta	9	5	11	25
Uterus Atony	6	1	2	9
Unspecified	9	3	5	17
Hypertensive diseases	13 (26.0)	10 (40.0)	19 (34.5)	42 (32.3)
Eclampsia	11	9	14	34
Pre-eclampsia	2	1	5	8
Sepsis	3 (6.0)	-	4 (7.3)	7 (5.4)
Dystocia	-	-	1 (1.8)	1 (0.8)
Other[2]	1 (2.0)	-	1 (1.8)	2 (1.5)
Indirect obstetric[3]	3 (6.0)	3 (12.0)	9 (16.4)	15 (11.5)
Unknown	5 (10.0)	1 (4.0)	1 (1.8)	7 (5.4)
All	50 (100.0)	25 (100.0)	55 (100.0)	130 (100.0)

[1] early pregnancy deaths include two abortion deaths and one death from ectopic pregnancy

[2] other direct deaths include one death after a caesarean section and one death from a long embolus

[3] indirect causes include deaths associated with asthma, cardiac diseases, typhoid fever, tuberculosis and hepatitis

Table 3: Highest level of birth attendant for women who died, by district (deaths reported through the MPA system from 3 districts in South Kalimantan 1995 – 1999)

	Districts			
Birth attendant	**Banjar N (%)**	**Barito Kuala N (%)**	**HSS N (%)**	**All N (%)**
Family member	2 (4.0)	-	2 (3.6)	4 (3.1)
TBA	17 (34.0)	5 (20.0)	24 (43.6)	46 (35.4)
Midwife	14 (28.0)	9 (36.0)	9 (16.4)	32 (24.6)
Doctor	7 (14.0)	5 (20.0)	10 (18.2)	22 (16.9)
Unknown	10 (20.0)	6 (24.0)	10 (18.2)	26 (20.0)
All	50 (100.0)	25 (100.0)	55 (100.0)	130 (100.0)

Table 4: Factors contributing to maternal death (30 deaths reported through the MPA system from 3 districts in South Kalimantan 1998 – 1999)

Contributing factors	**N (%)**
Delay in decision-making	23 (76.7)
Lack of knowledge of danger signs	7 (23.3)
Economic constraints	11 (36.7)
Refusal to seek care	16 (53.3)
Delay in reaching health provider or facility	10 (33.3)
Long distance to medical facility	7 (23.3)
Lack of transportation	4 (13.3)
Difficult road conditions	2 (6.7)
No health provider near case	2 (6.7)
Poor quality of care by health provider and/or at health facility	18 (60.0)
Equipment shortage	4 (13.3)
Drug shortage	2 (6.7)
Delay in seeing health provider	11 (36.7)
Inadequate care	8 (26.7)
Care not conform with protocols	7 (23.3)

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